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15. The electromagnetic field system of Claim 14, wherein

the frequency of said frequency signal is selected such that the wavelength is greater than twice the dimension of said grid opening size.

A marked-up version of the changes made is attached hereto. The attached page is captioned "Version with markings to show changes made."

REMARKS

Applicant and counsel wish to thank the Examiner for his detailed comments. Applicant submits an amended claim 1 differentiating the subject matter from that set forth in the references cited. Applicant has deleted claims 4, 5 and 12, as superfluous and further submits new claims 14 and 15 setting forth the subject matter in a different form, again in a manner which differentiates the subject matter. As the rejection by the Examiner was based on the claims as originally stated, it is believed that the amendments to the claims overcomes the rejection.

The basis stated for rejection relates to the teachings set forth primarily in the cited reference of Kuo. As previously argued, the actual invention of Kuo and that set forth in the present application are drastically different in function, operation and effect. However, Applicant acknowledges that the language of the originally stated claim 1 could be interpreted as encompassing the teachings of Kuo. Applicant has accordingly amended claim 1 to set forth the clear differences in the inventions.

Kuo teaches a transmission line system. While the "field" generated in Kuo is possibly described as quasi-static and non-propagating, this is because transmission line structures are intended to be completely non-radiating. The teaching of Kuo shows a pick up loop operating with the transmission line. To the degree that this functions at all, it is only due to extreme proximity. The very nature of the transmission line structure avoids radiation and minimizes any field extending beyond the immediate vicinity of the line. The Kuo structure is completely incapable of functioning in the manner shown and described in the present application.

Applicant now understands that the operation of his invention is primarily due to the phenomenon known as "evanescent waves". This phenomenon is described in the article, On Evanescent Waves, A.Stahlhofen and H. Druxes, Univeristy Koblenz, Inst. F. Physik, Rheinau 1, D-56075 Koblenz, Germany, Paragraph entitled "Properties of evanescent waves".

"*Any propagating wave is converted into an evanescent wave when hitting a classically forbidden region. In this case, at least one component of the wavevector **k** becomes imaginary or complex and the wave experiences exponential damping when propagating in this region. The evanescent wave formed at the boundary of the forbidden region is again converted into a normally propagating wave after crossing and leaving the forbidden region. Such waves are used as diagnostic tools in many contexts involving waveguides; applications range from diverse areas of solid state physics over optics and microwave-technologies to biophysics (biosensors and ultrasound-diagnostics), chemistry and environmental physics. The explicit examples show, that evanescent waves play an important role in microwaves, optics, quantum mechanics and elastic waves (2). (In quantum mechanics, applications offered themselves through the advent of (electronic or photonic) scanning tunneling microscopes (4).) Despite the fact, that all of these systems are governed by different wave-equations, different dispersion laws, different energy regimes and completely different structures and sizes, wave motion in the respective systems under consideration often involves evanescent waves. Electromagnetic evanescent waves – which gained tremendous popularity in recent years due to reports of superluminal velocities observed in tunneling time*

experiments with classical electromagnetic evanescent modes (5,6) – are the classical analogues of the tunneling solutions of the Schrödinger equation in case of effectively one-dimensional barriers. It is a more or less straightforward exercise to formulate this correspondence in detail using the respective wave equations; in case of elastic waves, a similar analogy can be formulated when using a tensorial form of Maxwell's equations.

The typical mechanisms accounting for the existence of evanescent waves are: (i) conversion into other forms of energy in lossy media, (ii) cut-off modes in certain directions resulting from reflections in lossless media, (iii) gradual leakage of energy from certain guiding structures and (iv) mode conversion produced by obstacles or by changes in guiding structures. It should be noted, that most of these phenomena correspond to some kind of tunneling processes; examples of these mechanisms in various systems and their concrete application can be found in (1,2,7).

Evanescent waves have some peculiar properties sometimes defying intuition. As a typical example we mention the fact, that they propagate in the forbidden region experiencing exponential damping but without aquiring a phase shift in course of this motion (5). This implies, that the phase-time velocity associated with the familiar group-delay and defined in terms of the frequency derivative of the phase shift is infinite ..."

Another term which is now understood to be relevant to the present invention is the term "waveguide below cut-off" as defined in "Fields and Waves in Modern Radio", page 386.

"The higher order waves which may exist in coaxial lines and all waves which may exist in hollow pipe wave guides are characterized by cut-off frequencies. If the waves are to be used for propagating energy, we are of course interested only in the behavior above cut-off. However, the behavior of these reactive or local waves below cut-off is important in at least two practical cases:

1. *Application to wave guide attenuators.*

2. *Effects at discontinuities in transmission systems.*

The attenuation properties of these waves below cut-off have been developed in the previous analyses. It has been found that below the cut-off frequency there is an attenuation only and no phase shift in an ideal guide. The characteristic wave

impedance is a purely imaginary quantity – a re-emphasis of the fact that no energy can propagate down the guide. This is not a dissipative attenuation as is that due to resistance and conductance in transmission systems with propagating waves. It is a purely reactive attenuation, analogous to that in a filter section made of reactive elements, when this is in the cut-off region. The energy is not lost but is reflected back to the source so that the guide acts as a pure reactance to the source ..."

Applicant recognizes that neither of these terms is presented in the original disclosure and cannot support claim language drawn therefrom. Accordingly, Applicant has amended the claims utilizing distinguishing language present in the original disclosure. The above discussion of the evanescent and waveguide below cut-off phenomena is presented to aid the Examiner in understanding the invention in different terminology and in showing how fundamentally and conceptually different the phenomena of the current invention are from the teaching of Kuo.

The phenomenon of the present invention may be described in terms of a "cavity resonator" as illustrated in the disclosure on page 11. The method of claim 1, as amended, is now limited to situations where a conductive array existing within the structure is excited in such a manner that the structure itself functions as a cavity resonator, excluding exterior signals and acting to convey the signal to the desired interior receiver. By defining the invention in these terms, the cited teachings of Kuo and other earlier cited references are clearly distinguished, without any potential risk of invoking a perception of the introduction of new matter. Kuo clearly does nothing similar to this.

Kuo is unquestionably a transmission line system. All transmission lines are characterized in that the energy they carry is confined to the transmission line itself and the very immediate vicinity. This is the complete antithesis of the present

invention, where the energy is caused to extend into and throughout the cavity, so that it may interact with the receiver elements situated effectively anywhere within the cavity. Conceptually and operationally, Kuo is entirely different.

Similarly, new claim 14 is submitted as stating the nature of the invention in another manner, as presented in the disclosure. In the wording of claim 14, the system is defined in terms of the conductive grid array formed by the conductor present in the building structure. As described on page 15 of the specification, the conductors present within the structure (plumbing fixtures, electrical wiring, metal girders, and the like) define a grid structure, with grid openings existing at the exterior (generally being defined by the size of the exterior rooms, windows and totally non-conductive gaps of the building). As taught in the present disclosure, when the grid opening size is small with respect to the wavelength of the excitation frequency (when the electromagnetic field system is operated), the structure operates as an effectively isolated "bubble" which reduces outside effects. This is a concept completely removed from that taught in the prior art, and particularly within the cited art.

In the language of claim 15, also gleaned from the teachings of page 15 of the specification, the frequency of operation is further limited to that with a wavelength of at least twice the dimension of the grid opening. At this dimensional ratio, the "cut-off" occurs and the bubble effect is complete.

When stated in these terms, it is submitted that the present invention is now claimed in such a manner that it meets all statutory requirement, is completely distinguished from the prior art, and is appropriate for allowance at this stage.

Conclusion

Applicant has endeavored to put this case into complete condition for allowance. Applicant therefore asks that the rejections be withdrawn and that allowance of all claims presently in the case now be granted.

Respectfully Submitted,

Michael J. Hughes
Reg. No. 29,077

Oppenheimer Wolff and Donnelly LLP
1901 South Bascom Avenue, Suite 660
Campbell, California 95008

Telephone: 408-558-7890
Facsimile: 408-558-9960
E-mail: michaelh@iplo.com

MJH:mjh

VERSION WITH MARKINGS TO SHOW CHANGES MADE.

In the claims:

Claim 1 has been rewritten as follows:

1. A method comprising the steps of:

generating a radio frequency signal;

feeding said frequency signal to a conductor; said conductor ~~generally~~ being *a conductive array existing* within a structure;

creating a quasi-static non-propagating electromagnetic field within said structure, *said electromagnetic field extending from said conductor in a manner such that said structure forms a cavity resonator*; and

using said electromagnetic field to convey said radio frequency signal to a receiver generally located within said structure.

New Claims 14 and 15 have been added as follows:

14. An electromagnetic field system, comprising:

a structure including an electrically conductive grid array having a grid opening size; and

means for generating a quasi-static non-propagating electromagnetic filed within said structure by feeding a frequency signal into said electrically conductive grid array;

wherein the frequency of said frequency signal is selected such that the dimension of said grid opening size is small relative to the wavelength of said frequency signal.

15. The electromagnetic field system of Claim 14, wherein

    the frequency of said frequency signal is selected such that the wavelength is greater than twice the dimension of said grid opening size.